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Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR 1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 06816/017003	Application No. -
	Applicant Eric R. Fossum, et al.		
	Filing Date June 27, 2000	Group Art Unit	

Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	ABB							

Other Documents (include Author, Title, Date, and Place of Publication)								
Examiner Initial	Desig. ID	Document						
	ACC	S. Chamberlain, "Photosensitivity and Scanning of Silicon Image Detector Arrays," IEEE J. Solid State Circuits, Vol. SC-4, No. 6, pp. 333-342 (December 1969)						
	ADD	M. Aoki, et al., "2/3 Inch Format MOS Single-Chip Color Imager," IEEE Trans. On Electron Devices, Vol. ED-29, No. 4, pp. 745-750 (April 1982)						
	AEE	J. Hyncek, "A New Device Architecture Suitable for High-Resolution and High-Performance Image Sensors," IEEE Trans. on Electron Devices, Vol. 35(5), pp. 646-652 (May 1988)						
	AFF	F. Andoh, et al., "A 250,000-Pixel Image Sensor with FET Amplification at Each Pixel for High-Speed Television Cameras," 1990 IEEE International Solid-State Circuits Conference, Digest of Technical Papers, pp. 212-213 (February 16, 1990)						
	AGG	N. Tanaka, et al., "A 310K Pixel Bipolar Imager (BASIS)," IEEE Trans. On Electron Devices, Vol. 37(4), pp. 964-971 (April 1990)						
	AHH	K. Chen, et al., "PASIC: A Processor-A/D converter-Sensor Integrated Circuit," IEEE ISCAS, pp. 1705-1708 (1990)						
	AII	O. Yadid-Pecht, et al., "A Random Access Photodiode Array for Intelligent Image Capture," IEEE Trans. on Electron Devices, Vol. 38, No. 8, pp. 1772-1780 (August 1991)						
	AJJ	M. Kyomasu, "A New MOS Imager Using Photodiode as Current Source," IEEE Journal of Solid State Circuits, Vol. 26, No. 8, pp. 1116-1122 (August 1991)						
	AKK	R. Forchheimer, et al., "MAPP2200 - A Second generation smart optical sensor," Proc. SPIE, Vol. 1659, pp. 2-11 (1992)						
	ALL	C. Jansson, et al., "An Addressable 256 x 256 Photodiode Image Sensor Array with an 8-Bit Digital Output," Analog Integrated Circuits and Signal Processing, Vol. 4, pp. 37-49 (1993)						
	AMM	H. Kawashima, et al., "A 1/4 Inch Format 250K Pixel Amplified MOS Image Sensor Using CMOS Process," IEEE IEDM Tech. Digest, pp. 22.4.1-22.4.4 (1993)						
	ANN	S. Mendis, et al., "Design of a Low-Light-Level Image Sensor with On-chip Sigma-Delta Analog-to-Digital Conversion," SPIE, Charge Coupled Devices & Solid State Optical Sensors III, Vol. 1900, pp. 31-39 (1993)						
	AOO	M. Sugawara, et al., "An Amplified MOS Imager Suited for Image Processing," 1994 IEEE International Solid-State Circuits Conference, Digest of Technical Papers, Session 13, Neural Networks and Image Sensors/ Paper TP 13.6, pp. 228-229 (1994)						
	APP	B. Fowler, et al., "A CMOS Area Image Sensors with Pixel-Level A/D Conversion," 1994 IEEE International Solid-State Circuits Conference, Digest of Technical Papers, Neural Networks and Image Sensors/ Paper TP 13.5, pp. 226-227 (1994)						
	AQQ	B. Pain, et al., "Approaches and analysis for on-focal-plane analog-to-digital conversion," Proc. SPIE, Vol. 2226, pp. 208-218 (1994)						
	ARR	A. Gruss, et al., "Integrated Sensor and Range-Finding Analog Signal Processor," IEEE Journal of Solid State Circuits, Vol. 26, No. 3, pp. 184-191 (March 1991)						
	ASS	Renshaw, et al., "ASIC Image Sensors," Proc. IEEE ISCAS, pp. 3038-3041 (1990)						

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EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

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	ATT	O. Vellacott, "CMOS in camera," IEE Review, pp. 111-114 (May 1994)
	AUU	I. Muirhead, "Developments in CMOS Camera Technology," published by: IEE, Savoy Place, London WC2R 0BL, UK, pp. 5/1-5/4 (1994)
	AVV	I. Takayanagi, et al., "A Multiple Output CMD Imager for Real-Time Image Processing," IEEE, IEDM, pp. 22.5.1-22.5.4 (1993)
	AWW	M. White, et al., "Characterization of Surface Channel CCD Image Arrays at Low Light Levels," IEEE Journal of Solid-State Circuits, Vol. SC-9, No. 1, pp. 1-13 (February 1974)
	AXX	W. Yang, et al., "A full-fill factor CCD imager with integrated signal processors," IEEE International Solid-State Circuits Conference Digest of Technical Papers, pp. 218-219 and 300 (February 16, 1990)
	AYY	R. Forchheimer, "Single-chip image sensors with a digital processor array," Journal of VLSI Signal Processing, Vol. 5, pp. 121-131 (1993)
	AZZ	E. Fossum, et al., "Development of CMOS Active Pixel Image Sensors for Low Cost Commercial Applications," Conference Proceedings of NASA Technology 2004, pp. 1-2 (November 1994)
	AAAA	E. Fossum, et al., "Application of the active pixel sensor concept to guidance and navigation," SPIE, Vol. 1949, Space Guidance, Control and Tracking, paper 30, pp. 1-8 (1993)
	ABBB	E. Fossum, "Assessment of Image Sensor Technology for Future NASA Missions," Proceedings of the SPIE, Vol. 2172, Charge-Coupled Devices and Solid-State Optical Sensors IV, pp. 1-16 (1994)
	ACCC	T. Kuriyama, et al., "A 1/3-in 270 000 Pixel CCD Image Sensor," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors, Vol. 38, No. 5, pp. 949-953 (May 1991)
	ADDD	J. Hojo, et al., "A 1/3-in 510(H) x 492(V) CCD Image Sensor with Mirror Image Function," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors, Vol. 38, No. 5, pp. 954-959 (May 1991)
	AEEE	H. Ando, et al., "A 1/2-in CCD Imager with Lateral Overflow-Gate Shutter," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors, Vol. 38, No. 5, pp. 960-964 (May 1991)
	AFFF	A. Toyoda, et al., "A Novel Tungsten Light-Shield Structure for High-Density CCD Image Sensors," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors, Vol. 38, No. 5, pp. 965-968 (May 1991)
	AGGG	T. Ozaki, et al., "A Low-Noise Line-Amplified MOS Imaging Devices," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors, Vol. 38, No. 5, pp. 969-975 (May 1991)
	AHHH	M. Yamagishi, et al., "A 2 Million Pixel FIT-CCD Image Sensor for HDTV Camera Systems," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors, Vol. 38, No. 5, pp. 976-980 (May 1991)
	AIII	E. Stevens, et al., "A 1-Megapixel, Progressive-Scan Image Sensor with Antiblooming Control and Lag-Free Operation," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors, Vol. 38, No. 5, pp. 981-988 (May 1991)
	AJJJ	K. Matsumoto, et al., "The Operation Mechanism of a Charge Modulation Device (CMD) Image Sensor," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors, Vol. 38, No. 5, pp. 989-998 (May 1991)

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	AKKK	K. Matsumoto, et al., "Analysis of Operational Speed and Scaling Down the Pixel Size of a Charge Modulation Device (CMD) Image Sensor," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 999-1004 (May 1991)
	ALLL	M. Ogata, "A Small Pixel CMD Image Sensor," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1005-1010 (May 1991)
	AMMM	Hyncek, "BCMD - An Improved Photosite Structure for High-Density Image Sensors," IEEE Transactions on Electron Devices, Vol. 38(5), pp. 1011-1020 (May 1991)
	ANNN	T. Mizoguchi, et al., "A 250 k-Pixel SIT Image Sensor Operating in its High-Sensitivity Mode," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1021-1027 (May 1991)
	AOOO	Y. Nakamura, et al., "Design of Bipolar Imaging Device (BASIS)," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1028-1036 (May 1991)
	APPP	M. Miyawaki, et al., "Reduction of Fixed-Pattern Noise of BASIS Due to Low Kinetic Energy Reactive Ion to Low Kinetic Energy Reactive Ion and Native-Oxide-Free Processing," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1037-1043 (May 1991)
	AQQQ	Y. Matsunaga, et al., "A High-Sensitivity MOS Photo-Transistor for Area Image Sensor," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1044-1047 (May 1991)
	ARRR	N. Mutoh, et al., "New Low-Noise Output Amplifier for High-Definition CCD Image Sensor," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1048-1055 (May 1991)
	ASSS	M. Tabel, et al., "A New CCD Architecture of High-Resolution and Sensitivity for Color Digital Still Picture," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1052-1058 (May 1991)
	ATTT	J. Bosiers, et al., "A 2/3-in 1187(H) x 581(V) S-VHS-Compatible Frame-Transfer CCD for ESP and Movie Mode," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1059-1068 (May 1991)
	AUUU	B. Burke, "An Abutable CCD Imager for Visible and X-Ray Focal Plane Arrays," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1069-1076 (May 1991)
	AVVV	E. Garcia, "CCD Arrays for Readout of Electrophotographic Latent Images," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1077-1085 (May 1991)
	AWWW	T. Kaneko, et al., "400 dpi Integrated Contact Type Linear Image Sensors with Poly-Si TFT's Analog Readout Circuits and Dynamic Shift Registers," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1086-1093 (May 1991)
	AXXX	C. K. Chen, et al., "Ultraviolet, Visible, and Infrared Response of PtSi Schottky-Barrier Detectors Operated in the Front-Illuminated Mode," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1094-1103 (May 1991)
	AYYY	R. B. Bailey, et al., "256 x 256 Hybrid HgCdTe Infrared Focal Plane Arrays," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1104-1109 (May 1991)

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	AZZZ	H. Zogg, et al., "Infrared Sensor Arrays with 3-12 μ m Cutoff Wavelengths in Heteroepitaxial Narrow-Gap Semiconductor on Silicon Substrates," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1110-1117 (May 1991)
	AAAAA	C. G. Bethea, et al., "10- μ m GaAs / AlGaAs Multiquantum Well Scanned Array Infrared Imaging Camera," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1118-1123 (May 1991)
	ABBBB	L. J. Kozlowski, et al., "LWIR 128 x 128 GaAs / AlGaAs Multiple Quantum Well Hybrid Focal Plane Array," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1124-1130 (May 1991)
	ACCCC	M. Denda, et al., "4-Band x 4096-Element Schottky-Barrier Infrared Linear Image Sensor," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1131-1135 (May 1991)
	ADDDD	S. Tohyama, et al., "A New Concept Silicon Homojunction Infrared Sensor," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1136-1140 (May 1991)
	AEEEE	T-L Lin, et al., "SiGe / Si Heterojunction Internal Photoemission Long-Wavelength Infrared Detectors Fabricated by Molecular Beam Epitaxy," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1141-1144 (May 1991)
	AFFFF	M. Okuyama, et al., "Room-Temperature-Operated Infrared Image CCD Sensor Using Pyroelectric Gate Coupled by Dielectric Connector," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1145-1151 (May 1991)
	AGGGG	J.G.C. Bakker, "Simple Analytical Expressions for the Fringing Field and Fringing-Field-Induced Transfer Time in Charge-Coupled Devices," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1152-1161 (May 1991)
	AHHHH	E. K. Banghart, et al., "A Model for Charge Transfer in Buried-Channel Charge-Couple Devices at Low Temperature," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1162-1174 (May 1991)
	AIIII	C. R. Hoople, et al., "Characteristics of Submicrometer Gaps in Buried-Channel CCD Structures," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1175-1181 (May 1991)
	AJJJJ	E.R. Fossum, et al., "Two-Dimensional Electron Gas Charge-Coupled Devices (2DEG-CCD's)," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1182-1192 (May 1991)
	AKKKK	J.G.C. Bakker, et al., "The Tacking CCD: A New CCD Concept," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1193-1200 (May 1991)
	ALLLL	S. Takayama, et al., "A Dynamic Model of an a-Si:H Photoconductive Sensor," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1201-1205 (May 1991)
	AMMM	P. Centen, "CCD On-Chip Amplifiers: Noise Performance versus MOS Transistor Dimensions," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1206-1216 (May 1991)
	ANNNN	N. Ozawa, et al., "A Correlative Coefficient Multiplying (CCM) Method for Chrominance Moire Reduction in Single-Chip Color Video Cameras," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors," Vol. 38, No. 5, pp. 1217-1225 (May 1991)

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	A0000	Y.T. Tsai, "Color Image Compression for Single-Chip Cameras," IEEE Transaction on Electron Devices, Special Issue on Solid State Image Sensors, Vol. 38, No. 5, pp. 1226-1232 (May 1991)
	APPPP	P. Noble, "Self-Scanned Silicon Image Detector Arrays," IEEE Trans. on Electron Devices, Vol. ED-15, No. 4, pp. 202-209 (April 1968)
	AQQQQ	J. Nishizawa, et al., "Static Induction Transistor Image Sensors," IEEE Trans. on Electron Devices, Vol. ED-26 (12), pp. 1970-1977 (December 1979)
	ARRRR	K. Matsumoto, et al., "A New MOS Phototransistor Operating in a Non-Destructive Readout Mode," Jpn. J. Appl. Phys., Vol. 24, No. 5, pp. L323-L325 (1985)
	ASSSS	H. Ando, et al., "Design Consideration and Performance of a New MOS Imaging Device," IEEE Trans. on Electron Devices, Vol. ED-32, No. 8, pp. 1484-1489 (August 1985)
	ATTTT	T. Nakamura, et al., "A New MOS Image Sensor Operating in a Non-Destructive Readout Mode," IEDM Tech. Dig., pp. 353-356 (1986)
	AUUUU	A. Yusa, et al., "SIT Image Sensor: Design Considerations and Characteristics" IEEE Trans. on Electron Devices, Vol. ED-33, No. 6, pp. 735-742 (June 1986)
	AVVVV	N. Tanaka, et al., "A Novel Bipolar Image Device with Self-Noise-Reduction Capability," IEEE Trans. on Electron Devices, Vol. 36(1), pp. 31-38 (January 1989)
	AWWW	Z. Huang, et al., "A Novel Amplified Image Sensor with a-Si:H Photoconductor and MOS Transistor," IEEE Trans. on Electron Devices, Vol. 37, No. 6, pp. 1432-1438 (June 1990)
	AXXXX	Y. Nakamura, et al., "Design of Bipolar Imaging Devices (BASIS): Analysis of Random Noise," IEEE Trans. on Electron Devices, Vol. 39(6), pp. 1341-1349 (June 1992)
	AYYYY	E. Fossum, "Active-pixel sensors challenge CCDs," Laser Focus World, Vol. 29, pp. 83-87 (June 1993)
	AZZZZ	S. Mendis, et al., "A 128 x 128 CMOS Active Pixel Image Sensor for Highly Integrated Imaging Systems," Proc. of the 1993 IEEE International Electron Devices Meeting, pp. 583-586 (1993)
	AAAAA	S. Mendis, et al., "Progress in CMOS Active Pixel Image Sensors," Proc. SPIE, Vol. 2172, pp. 19-29 (1994)
	ABBBB	S. Mendis, et al., "CMOS Active Pixel Image Sensor," IEEE Trans. on Electron Devices, Vol. 41, No. 3, pp. 452-453 (March 1994)
	ACCCC	T. Kinugasa, et al., "An Electronic Variable-Shutter System in Video Camera Use," IEEE Transactions on Consumer Electronics, Vol. CE-33, No. 3, pp. 249-255 (1987)
	ADDDD	S. Mendis, et al., "CMOS Active Pixel Image Sensor," Citation Unknown, pp. 1-7 (July 1993)

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